Name: _____                                    Date: _____
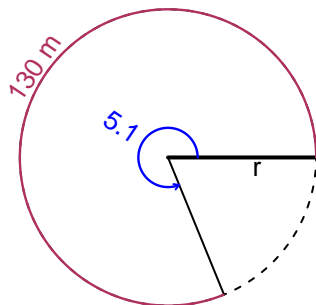
## Trig Final (SLTN v635)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 130 meters. The angle measure is 5.1 radians. How long is the radius in meters?
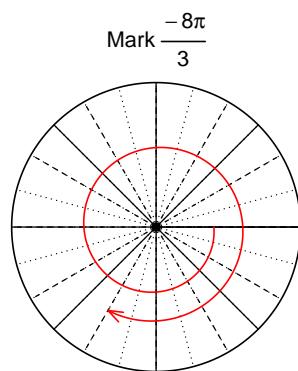


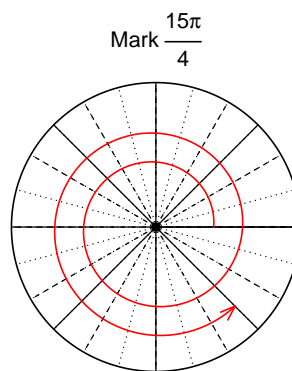$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

$r = 25.49$ meters.

### Question 2

Consider angles $\frac{-8\pi}{3}$ and $\frac{15\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-8\pi}{3}\right)$ and $\cos\left(\frac{15\pi}{4}\right)$ by using a unit circle (provided separately).



Mark $\dfrac{-8\pi}{3}$

Find $\sin(-8\pi/3)$



Mark $\dfrac{15\pi}{4}$

Find $\cos(15\pi/4)$

$\sin(-8\pi/3) = \frac{-\sqrt{3}}{2}$
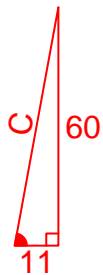
$\cos(15\pi/4) = \frac{\sqrt{2}}{2}$

**Question 3**

If $\tan(\theta) = \frac{-60}{11}$, and $\theta$ is in quadrant IV, determine an exact value for $\cos(\theta)$.
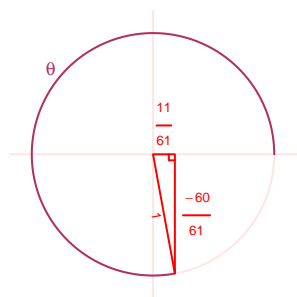
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$11^2 + 60^2 = C^2$$
$$C = \sqrt{11^2 + 60^2}$$
$$C = 61$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\cos(\theta) = \frac{11}{61}$$

**Question 4**

A mass-spring system oscillates vertically with an amplitude of 3.4 meters, a frequency of 5.39 Hz, and a midline at $y = 7.26$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height ($y$ in meters) as a function of time ($t$ in seconds).

Any of these equations would get full credit.

$$y = 3.4\sin(2\pi 5.39t) + 7.26$$

or

$$y = 3.4\sin(10.78\pi t) + 7.26$$

or

$$y = 3.4\sin(33.87t) + 7.26$$